

Drawings:

The word “Commuter” in Figures 8 and 14 has been changed to the word “Commutator” based on Examiner’s requirement. Figures 8 and 14, in the top margin, have been labeled “Replacement Sheet.” The amended replacement-drawing sheets are also included all of the figures appearing on the immediate prior version of the sheet in the Attachment to Amendment A.

REMARKS - General

By the above amendment, applicant has amended the drawings, specification, and abstract to emphasize the novelty of the invention.

Application has also rewritten all of the claims to define the invention more particularly and distinctly so as to overcome the technical objections and rejections and define the invention patentably over the prior art references.

The Objection To The Drawings Objections

The drawings are objected to because in Figures 8 and 14, "Commuter" is misspelled.

Applicant has changed the word "Commuter" to the word "Commutator" in Figures 8 and 14 and amended replacement-drawing sheets, which include all of the figures appearing on the immediate prior version of the sheet. Accordingly, applicant submits that the replacement drawing sheets comply with Examiner's requirements and therefore requests reconsideration and withdrawal of the objections.

The Objection To The Disclosure Objections

The disclosure is objected to because of the informalities as stated in the Office Action.

There are a total of 28 item informalities that are objected in the disclosure. Applicant has currently amended all of the item informalities in the disclosure. Accordingly, applicant submits that the disclosure complies with Examiner's requirements and therefore requests reconsideration and withdrawal of the objections.

The Objection To The Abstract Objections

The abstract is objected to because of the informalities as stated in the Office Action.

There are a total of 2 item informalities that are objected in the abstract. Applicant has currently amended all of the item informalities in the abstract. Accordingly, applicant

submits that the abstract also complies with Examiner's requirements and therefore requests reconsideration and withdrawal of the objections.

The Objection To The Claims Objections

The claims 1, 6, 11, 13, 16, 20, and 21 were objected because of the following informalities as stated in the Office Action.

Applicant has cancelled all of above claims and substituted new claims with correct informalities based on Examiner's requirements. Accordingly, applicant submits that the new claims comply with Examiner's requirements and therefore requests reconsideration and withdrawal of the objections.

The Rejection of Claims 1 – 2 and 4 on Crochier, et al. (Multirate Digital Signal Processing; 1983; Prentice-Hill) in view of Tewfik (High Bit Rate Ultra-Wideband OFDM; Nov. 17-21, 2002; IEEE Globecom 2002; pages 2260-2264) and further in view of Fattouche et al. (US RE37802) Under 35 USC 103(a) Are Overcome.

The office action rejected the independent claim 1 and the dependent claims 2 and 4 over the book of Crochier, et al. in view of the paper on Tewfik and further in view of the patent on Fattouche et al.

The independent claim 1 and the dependent claims 2 and 4 are canceled. A new independent claim 24 and new dependent claims 25 and 27 are substituted.

The Rejection of Claims 3 and 4 on Crochier, et al. (Multirate Digital Signal Processing; 1983; Prentice-Hill) in view of Tewfik (High Bit Rate Ultra-Wideband OFDM; Nov. 17-21, 2002; IEEE Globecom 2002; pages 2260-2264) and further in view of Fattouche et al (US RE37802) and Hudson (US 20030043887) Under 35 USC 103(a) Are Overcome.

The office action rejected the dependent claims 3 and 4 over the book of Crochier, et al. in view of the paper on Tewfik and further in view of the patent on Fattouche and the patent application on Hudson.

The dependent claims 3 and 4 are canceled. New dependent claims 26 and 27 are substituted.

The Rejection of Claim 5 on Crochiere, et al. (Multirate Digital Signal Processing; 1983; Prentice-Hill) in view of Tewfik (High Bit Rate Ultra-Wideband OFDM; Nov. 17-21, 2002; IEEE Globecom 2002; pages 2260-2264) and further in view of Fattouche et al (US RE37802) and view of Van Nee (US 6,175,550) Under 35 USC 103(a) Are Overcome.

The office action rejected the dependent claim 5 over the book of Crochiere, et al. in view of the paper on Tewfik and further in view of the patent on Fattouche and the patent on Van Nee.

The dependent claim 5 is canceled. New dependent claim 28 is substituted.

The Rejection of Claim 6 on Kim et al. (US 6,490,267) and in view of Sklar (Digital Communications; 2001; Prentice Hall; pages 732-735) Under 35 USC 103(a) Are Overcome.

The office action rejected the independent claim 6 over the patent of Kim et al. in view of the book on Sklar.

The independent claim 6 is canceled. The new dependent claim 29 is substituted.

The Rejection of Claims 7 - 9 on Kim et al. (US 6,490,267) in view of Sklar (Digital Communications; 2001; Prentice Hall; Pages 732-735) and further in view of Harrison (US 5,396,489) Under 35 USC 103(a) Are Overcome.

The office action rejected the dependent claims 7 - 9 on patent of Kim in view of the book of Sklar and further in view of the patent on Harrison.

The dependent claims 7 - 9 are canceled. The new dependent claims 30 - 32 are substituted.

The Rejection of Claims 10 - 12 on Kim et al. (US 6,490,267) in view of Sklar (Digital Communications; 2001; Prentice Hall; Pages 732-735) and further in view of Hudson (US 20030043887) Under 35 USC 103(a) Are Overcome.

The office action rejected the dependent claims 10 - 12 on patent of Kim in view of the book on Sklar and further in view of the patent application on Hudson.

The dependent claims 10 - 12 are canceled. The new dependent claims 33 and 35 and the new independent claim 34 are substituted.

The Rejection of Claims 13 - 15 on Crochier, et al. (Multirate Digital Signal Processing; 1983; Prentice-Hill) in view of McClellan (A Unified Approach to the Design of Optimum FIR Linear Phase Digital Filters; Nov. 1973; IEEE Transactions on Circuit Theory; pages 697 - 701) and further in view of Fattouche et al. (US RE37802) Under 35 USC 103(a) Are Overcome.

The office action rejected the independent claim 13 and the dependent claims 14 - 15 over the book of Crochier, et al. in view of the paper on McClellan and further in view of the patent on Fattouche et al.

The independent claim 13 and the dependent claims 14 - 15 are canceled. The new dependent claims 36 - 38 are substituted.

The Rejection of Claims 16 - 18 on Graham (US 5,412,352) in view of Harrison (US 5,396,489) Under 35 USC 103(a) Are Overcome.

The office action rejected the independent claim 16 and the dependent claims 17 - 18 on the patent of Graham in view of the patent of Harrison.

The independent claim 16 and the dependent claims 17 - 18 are canceled. The new dependent claims 39 and 41, and the new independent claim 40 are substituted.

The Rejection of Claims 19 - 20 on Graham (US 5,412,352) in view of Harrison (US 5,396,489) and further in view of Agee (US 6,128,276) Under 35 USC 103(a) Are Overcome.

The office action rejected the dependent claims 19 - 20 on the patent of Graham in view of the patent of Harrison and further in view of the patent on Agee.

The dependent claims 19 - 20 are canceled. The new dependent claims 42 - 43 are substituted.

The Rejection of Claims 21 - 22 on Umeda (US 4,170,760) in view of Harrison (US 5,396,489) Under 35 USC 103(a) Are Overcome.

The office action rejected the independent claim 21 and the dependent claim 22 on the patent of Umeda in view of the patent of Harrison.

The independent claim 21 and the dependent claim 22 are canceled. The new dependent claims 44 - 45 are substituted.

The Rejection of Claim 23 on Umeda (US 4,170,760) in view of Harrison (US 5,396,489) and further in view of Van Nee (US 6,175,550) Under 35 USC 103(a) Are Overcome.

The office action rejected the dependent claim 23 on the patent of Umeda in view of the patent of Harrison and further in view of the patent on Van Nee.

The dependent claim 23 is canceled. The new dependent claim 46 is substituted.

All of the new claims 24 - 46 are to emphasize the novelty of the invention and to define patentably over these prior-art references, and/or any combination thereof. Applicant requests reconsideration of these rejections, as now applicable to the new independent claim 24 and the corresponding new dependent claims 25 - 33 and the new independent claim 34 and the corresponding new dependent claims 35 – 39 and the new independent claim 40 and the corresponding new dependent claims 41 - 46 for the following reasons:

- (1) There are no justification, in Crochier, et al., Kim, et al., Graham, Umeda, or in any other prior arts separate from applicant's disclosure, which suggest that these references be individual or be combination way in the manner proposed.
- (2) Even if Crochier, et al., Tewfik, McClellan, Van Nee, Agee, Kim et al., Graham, Umeda, Hudson, Harrison, and Sklar were to be combined in the manner proposed, the proposed combination would not show all the novel physical features of the new claims 24 – 46.
- (3) These novel physical features of the new claims 24 - 46 produce new and unexpected results in such a way that proposed the spread spectrum based multichannel modulation for UWB Communications completely operates in the different methods and deals with the different UWB signals in the different situations that Crochier, et al., Kim et al., Graham, Umeda, or any other prior arts suggested, and therefore are novelty, unobvious and patentable over these prior-art references.

The References And Differences Of The Present Invention Thereover

Prior to discussing the claims and the above three points, applicant will first discuss the prior-art references and the general novelty of the present invention and its unobviousness over these prior-art references.

Present Invention - The present invention is a next-generation spread spectrum based multichannel modulation for wireless UWB communications, especially designed for 11 multichannels with orthogonal to each other based on orthogonal PN sequence. The invented UWB communication system is a spread spectrum based multichannel and multicarrier UWB communication solution, which is employed new technologies using a multichannel PN sequence mapping, a PN look-up table, a selectable multicarrier frequency, a multichannel-based multicarrier modulator, a multichannel-based multicarrier down converter, an UWB transmitter and receiver filter system along with a novel architecture. The designed UWB communication system not only meets FCC requirements of the indoor UWB emission limitation but also eliminate interference with

WLAN 802.11 devices, thereby allowing multi-devices to communicate and/or operate each other in the same environment. The invented UWB communication system is able to transmit a very high data rate up to 7.150 Gcps, which is far beyond these prior-art individuals and/or any combination references' capabilities.

Crochier, et al. presented a multichannel filter (page 292, Fig. 7.3; page 299, Fig. 7.8 element "Synthesize"; page 290, Section 7.1, Page 300, end of the section 7.2.1) a digital FIR lowpass-shaping filter (page 299, Fig. 7.8), a digital cascaded FIR filter (page 299, Fig. 7.8; page 297, page 258), the digital FIR low shaping filter (page 258, Fig. 6.4), the spectrum mask (page 259, Fig. 6.4; page 260), a multichannel spectrum (page 297, page 258), and a digital rejected FIR lowpass filter (Fig. 6.5). It can be seen that the multichannel filter is a filter bank, which is implemented by polyphase analysis and synthesis structures. All of subchannel filters are derived from the multichannel filter based on input samples with different phases. In other words, all the subchannel filters are a subset of the multichannel filter coefficients. It is also note that Crochier's digital lowpass filter, rejected FIR lowpass filter and/or the multichannel filter do not address an UWB communication transceiver. Crochier presents that the multichannels are orthogonal to each other based on a DFT approach since the DFT is orthogonal transformation, which is different from the applicant's orthogonal multichannel UWB approach based on the a set of orthogonal PN sequences. Furthermore, Crochier does not disclose any methods in which can be used to reduce interference with WLAN device's operation. Crochier does not disclose an UWB system and a spread spectrum, which can use PN sequences with orthogonal to each other. Crochier also does not disclose a multichannel PN sequence mapping, a selectable multicarrier frequency, a multichannel-based multicarrier modulator, and a multichannel-based multicarrier down converter. In addition, Crochier does not disclose how to provide a scalability data rate for an UWB communication transmitter and receiver.

However, the applicant's invention develops an UWB multichannel filter, which can be reused for all channels based on the UWB emission spectrum. It is the same UWB multichannel filter for all the UWB channels rather than subchannel filters with a subset

filter coefficients. In addition, the applicant's orthogonal multichannel modulation UWB system based on the orthogonal PN sequences is integrated with novel UWB transmitter and receiver architectures that are especially designed for wireless UWB applications.

The applicant's invention is not only to transmit scalability data rates in a very high speed but also to avoid interference with WLAN device's operations. Furthermore, the applicant's lowpass-shaping FIR filter within the UWB transceiver structure uses a multi-transition band mask that especially meets the FCC UWB emission limitation. It is clear that the applicant's novel architectures have even not been mentioned in Crochier's book. Therefore, the applicant's spread spectrum-based multichannel modulation for UWB communications is completely different from Crochier's multichannel filter, digital FIR lowpass filter and/or multichannel filter bank.

Tewfik, et al. disclosed a high bit rate Ultra-Wideband OFDM (page 2260 – page 2264; Fig. 1; Equations 1 and 2). Tewfik introduced an UWB OFDM system using a pulse design method, which is a pulse sequence with uniform spaced in time domain, such as rectangular or Gaussian pulse. Fig. 1 in Tewfik's paper shows the pulse sequence in time domain rather than in frequency domain. Tewfik focused on the formula developments rather than an UWB transceiver system and architecture. Furthermore, Tewfik did not address a multichannel filter, a digital lowpass-shaping filter or a digital rejected FIR filter design based on FCC emission limitation. In addition, Tewfik did not present any methods of transmitting a very high data rate with scalability and reducing interference with WLAN device's operations. Tewfik also does not disclose any architecture, such as a multichannel PN sequence mapping, a selectable multicarrier frequency, a multichannel-based multicarrier modulator, and a multichannel-based multicarrier down converter.

Note that the applicant's invention presents the spread spectrum-based multichannel modulation for UWB communications with a set of novel architectures along with the multichannel PN sequence mapping, the selectable multicarrier frequency, the multichannel-based multicarrier modulator, the multichannel-based multicarrier down converter, and the multichannel transmitter and receiver filter system. The applicant's

invention is able to transmit scalability data rates in a very high speed while interference between UWB transceivers and WLAN devices can be eliminated. Thus, it is clear that the applicant's spread spectrum-based multichannel modulation for UWB communications with novel systems and architectures are different from what Tewfik's presentation on pulse sequence methods.

Fattouche disclosed a multicode direct sequence spread spectrum (MC-DSSS), which allows an user information in a MC-DSSS signal to be decoded in a sequence of low complexity parallel operations to reduce intercode interference (ICI) (see Fig. 1 elements c(1), ..., c(N); column 3, line 64 –column 4, line 12). Fattouche's approach is designed for an user using MC-DSSS within one channel. It is clear that Fattouche's approach is not a multichannel approach and is not an approach for UWB communications. Hence, Fattouche's approach does not create multichannel modulation with orthogonal to each other and cannot produce a transmitting data rate for the UWB communications.

The applicant's approach is spread spectrum-based multichannel modulation for the UWB communications. All of the multichannels are especially designed with orthogonal to each other. An user data can be mapped to multichannels rather than a single channel for UWB transmitting at the same time, thereby generating a very high transmitting data rate up to 7.15 Gcps. Thus, it is impossible for Fattouche's approach to achieve such high data rate. In addition, the applicant's approach has a novel UWB communication architecture, including the multichannel PN sequence mapping along with the PN look-up table, the selectable multicarrier frequency, the multichannel-based multicarrier modulator, the multichannel-based multicarrier down converter, and the UWB multichannel transmitter and receiver filter, which Fattouche does not have. In addition, the applicant's lowpass-shaping FIR transmitter filter uses a multi-transition band mask that is especially designed to meet the FCC UWB emission limitation. The applicant's approach can avoid interference with WLAN device's operations. Thus, it is clear that Fattouche does not have such novel methods for the UWB communications.

Therefore, the applicant's spread spectrum-based multichannel modulation for the UWB communications is completely different from Fattouche's method of MC-DSSS approach.

Hudson disclosed a communication system and a method of estimating channel impulse response that is applicable to space-time coding. Hudson mentioned the 3GPP FDD standard (see page 15, paragraph 169) that the CPICH code is modulated repetitions of the 256-chip Walsh code. The data modulates orthogonal 16-chip Walsh codes drawn from the orthogonal variable spreading factor tree. The 16-chip is used for a user data.

The applicant's approach is to use the PN sequences from the PN look-up table. The PN sequences are used to create orthogonal multichannels to each other rather than for a user data in a single channel. In addition, the applicant's approach of using the PN sequence look-up table along with novel systems and architectures as the applicant discussed the above present invention. Therefore, it is clearly shown that the applicant's spread spectrum-based multichannel modulation for the UWB communications is completely different from Hudson's method of estimating channel impulse response.

Van Nee disclosed an orthogonal frequency division multiplexing (OFDM) system with dynamically scalable operating parameters and method thereof (column 3, lines 21-27; column 11, lines 23-28) with regard to the scalability data rates with multi-carrier frequencies based on an FFT approach. It is clear that Van Nee's OFDM system uses FFT and/or IFFF and each of multichannels with multi-carriers is indeed each FFT frequency bin. In other words, the number of the multichannels with multi-carrier is equal to the number of point FFT, which is transmitted with a single channel. On the other hand, the applicant's invention is the spread spectrum-based multichannel modulation for UWB communications, which each of the multichannels is also referred to as a multiband approach. The multiband approach is different from an OFDM approach since each multiband (or multichannel) only includes a carrier, while the OFDM includes a number of carriers with a channel. The OFDM is based on FFT that is frequency approach while the applicant's invention does not use an FFT. The multichannels (or multibands) are formed by using a multichannel PN sequence, a digital lowpass FIR filter along with a

multicarrier modulation and a set of the PN sequences. Therefore, the applicant's invention of using the spread spectrum-based multichannel modulation for UWB communications is completely different from what Van Nee's method on scalability data rates in an FFT approach is.

Kim et al. disclosed a device and method for generating spreading code and spreading channel signals using spreading code in a CDMA communication system. Kim discloses a set of delay units (Fig. 14, element 515; column 8, lines 13 – 36) and a set of downsampling units (Fig. 8; elements 222; column 6, lines 43 – 49). Note that Kim's delay is used to delay one chip in a channel as shown in Fig. 14, and Kim's downsampling unit as shown in Fig. 8, which is a decimator, is used to reduce a PN chip rate. The applicant's multichannel PN sequence mapping, including N-1 delay units, N downsampling units and N XOR units in parallel, is used to produce N multichannels with orthogonal to each other from a user data. Each of multichannels has a slower symbol rate R/N, where R is the symbol rate of the user data. In addition, multichannel chip data are transmitted into different channels with difference multicarriers. Furthermore, the applicant's multichannel PN sequence mapping is also with other novel architectures as discussed in the above present invention. Thus, it is clear that the applicant's invention of using the spread spectrum-based multichannel modulation for the UWB communications is completely different from Kim's method of generating spreading code for the CDMA communication system.

Sklar presented a XOR unit (page 733, Fig. 12.9 (b), "product" of (t) and $g(t)$; page 734, Fig. 12.10, waveforms (a), (b) and (c)). Note that Sklar' method of XOR unit is used to produce XOR operation for one channel to spreading data. The applicant's multichannel PN sequence mapping, including N-1 delay units, N downsampling units and N XOR units in parallel, is used to produce N multichannels with orthogonal to each other from a user data. Each of multichannels has a slower symbol rate R/N, where R is the symbol rate of the user data. Furthermore, multichannel data are transmitted into different channels with difference multicarriers. Therefore, the applicant's method of

using the multichannel PN sequence mapping in the spread spectrum-based multichannel modulation for the UWB communications is completely different from Sklar's method of the XOR operation for a direct-sequence spread-spectrum system.

Harrison disclosed a method and means for transmultiplexing signals between signal terminals and radio frequency channels. Harrison presented a set of multichannel that may be equivalent and implemented in parallel (Fig. 2; column 3, line 60 – column 4, line 25). Harrison's method includes a left switch, a set of filters, and a right switch to produce a set of multichannel. Note that Harrison used a set of filters between the left switch and the right switch. In addition, Harrison's method produces a set of multichannel that does not have orthogonal to each other. Harrison's method is also used in the receiver rather than in the transmitter. Thus, no multicarriers are used to all the multichannels. The applicant's invention of using the multichannel PN sequence mapping includes N-1 delay units, N downsampling units and N XOR units in parallel along with the PN sequence look-up table. The applicant's method produces a set of multichannels with orthogonal to each other. In addition, the applicant's method does not use a set of filters, which Harrison used. Furthermore, the applicant's method generates a set of multichannels along with a set of multicarries for the UWB transmitter. Therefore, the applicant's method of using the multichannel PN sequence mapping to generate a set of multichannels for the UWB communications is completely different from Harrison's method of using a set of multichannels for transmultiplexing signals between signal terminals and radio frequency channels.

McClellan, et al. introduced a unified approach to the design of optimum FIR linear-phase digital filters by using the Remez algorithm, which has become to one of methods for designing a standard digital lowpass FIR filter. However, McClellan does not address how to design transmitter and receiver filter system for an UWB communication transceiver. The applicant's invention is the spread spectrum-based multichannel modulation for UWB communications. The multichannel filter system including transmitter and receiver is one of subsystems along with other novel

architectures in UWB communication transceiver. The applicant's filter system meets the FCC emission limitation while McClellan does not address any UWB communications. Thus, it is clear that the applicant's invention of using the spread spectrum multichannel modulation for the UWB communications is different from what McClellan's method on a standard digital lowpass FIR filter design is.

Graham disclosed a modulator having direct digital synthesis for broadband RF transmission. Graham presented an analog lowpass filter and multicarrier frequencies (see Figures 2 and 3, elements 62, 66, 72; column 3, line 21 – 25). Note that Graham presented the element 62 of lowpass filter, the element 66 of frequency synthesizer, and the element 72 of microprocessor. The element 66 of frequency synthesizer is used to step the IF frequency up to the selected frequency for the reverse channel. Thus, it is clear that this is not multichannel-based multicarrier frequency, which the applicant used. The applicant's invention of the multichannel-based multicarrier frequencies contains a mixer, an analog lowpass filter, a commutator along with a switch, selectable N multicarrier frequencies, and the output of the selectable N multicarrier frequencies coupled to the commutator. Thus, the switch can select one of the N multicarriers to support multichannel operation. In addition, the applicant's multichannel-based multicarrier frequencies are integrated with other novel architectures as the applicant discussed in the present invention. Therefore, the applicant's multichannel-based multicarrier frequencies for the UWB communications is different from what Graham's method of using carrier for direct digital synthesis of broadband RF transmission is.

Agee disclosed a stacked-carrier discrete multiple tone communication technology and combinations with code nulling, interference cancellation, retrodirective communication and adaptive antenna arrays, which is that spreading energizes the bins of FFT (OFDM)-based communication. Referring to column 2 with lines 25-29 states "... under strong narrow-band interference, e.g., conventional cellular signal waveforms, by turning off affected frequency channels at a receiver despread." Thus, it is clear that Agee's invention of reducing interference by turning off affected channels at the receiver

rather than at the transmitter. In addition, Agee's invention considers the system to avoid interference from other devices. In other words, Agee's invention does not consider reducing interference to other devices. The applicant's invention considers reducing interference to other devices, such as WLAN devices, thereby leading to shut off some of multichannels at the transmitter to avoid interference to WLAN device operations in the same environment. Therefore, the applicant's invention of using the spread spectrum-based multichannel modulation for the UWB communications is different from what Agee's method on reducing interference for an affected frequency channels is at a receiver despread.

Umeda disclosed a radio receiver with frequency selection and muting. Umeda presented a multichannel-based multicarrier downconverter (see Fig. 1, elements 3, 4, 5, 6, 16; column 2, line 46 – column 3, line 7). The element 3 is a RF amplifier. The element 4 is a mixer. The element 5 is a variable oscillator. The element 6 is an IF amplifier. The element 16 is a record medium, which is used to originate a frequency selection signal. The applicant's method includes an analog bandpass filter, a downconverter, a multichannel filter, a commutator along with a switch, selectable multicarrier frequencies, and a multichannel control. As can be seen, the applicant's method of the multichannel-based multicarrier downconverter for the UWB communications is completely different from Umeda's method on selection frequencies not only in architectures but also in functions for multichannel-based multicarrier.

In summary, **Crochier, et al., Tewfik, et al., Fattouche, Hudson, Van Nee, Kim et al., Sklar, Harrison, McClellan, et al., Graham, Agee, and Umeda** are arts but they are different from each other. Crochier, et al. presented a multichannel filter based on filter bank approach. Tewfik, et al. presented a high bit rate Ultra-Wideband OFDM. Fattouche presented the MC-DSSS that allows user information in a MC-DSSS signal to be decoded in a sequence of low complexity parallel operations to reduce ICI. Hudson introduced the communication method of estimating channel impulse response in space-time processing. Van Nee invented an OFDM system with dynamically scalable

operating parameters and method with regard to the scalability data rates with multi-carrier frequencies based on an FFT approach. Kim, et al. disclosed the method for generating spreading code and spreading channel signals using spreading code in a CDMA communication system. Sklar presented the XOR unit for one channel to spreading data. Harrison described the method for transmuitiplexing signals between signal terminals and radio frequency channels. McClellan, et al. presented a unified approach to the design of optimum FIR linear-phase digital filters by using the Remez algorithm. Graham invented the modulator having direct digital synthesis for broadband RF transmission. Agee found the stacked-carrier discrete multiple tone communication technology and combinations with code nulling, interference cancellation, retrodirective communication and adaptive antenna arrays, which is a spreading code-based FFT OFDM communication system. Umeda disclosed the radio receiver with frequency selection and muting. They are for individual different design methods and different communication systems. Applicant's invention is the spread spectrum-based multichannel modulation for the UWB communications. It is especially designed for wireless UWB communications that meet the FCC emission requirements. Moreover, it is a single UWB communication device along with a set of novel architectures that enable to transmit a very-high UWB data rate up to 7.15 Gcps with scalability and programmability. In addition, it is designed to avoid interference with other WLAN devices during operations. Therefore, application's invention of using the spread spectrum-based multichannel modulation for the UWB communications is fundamentally different from Crochiere, et al., Tewfik, et al., Fattouche, Hudson, Van Nee, Kim et al., Sklar, Harrison, McClellan, et al., Graham, Agee, and Umeda's systems or any combination thereof. As a result, it is impossible and unobvious to one having ordinary skill in the art to develop the spread spectrum-based multichannel modulation for the UWB communications even given Crochiere, et al., Tewfik, et al., Fattouche, Hudson, Van Nee, Kim et al., Sklar, Harrison, McClellan, et al., Graham, Agee, and Umeda's prior-art references.

Crochiere, et al., Tewfik, et al., Fattouche, Hudson, Van Nee, Kim et al., Sklar, Harrison, McClellan, et al., Graham, Agee, and Umeda Do Not Contain Any Justification To Support Individual or Their Combination, Much Less In The Manner Proposed

With regard to the individual invention of Crochiere, et al., Tewfik, et al., Fattouche, Hudson, Van Nee, Kim et al., Sklar, Harrison, McClellan, et al., Graham, Agee, and Umeda, it has been shown that there are fundamentally differences between the applicant's invention and the individual invention of the prior-art references as the applicant discussed above. Therefore, it is invalid to use any prior-art references to reject the applicant's invention under 35 U.S.C. 103(a).

With regard to any combination of Crochiere, et al., Tewfik, et al., Fattouche, Hudson, Van Nee, Kim et al., Sklar, Harrison, McClellan, et al., Graham, Agee, and Umeda's prior art references, it is well known that in order to for any prior-art references themselves to be validly combined for use in a prior-art rejection of the Section 103, the reference themselves (or some other prior art) must suggest that they be combined, e.g., as was stated in In re Sernaker, 217 U.S.P.Q. 1.6 (C.A.F.C. 1983):

“Prior art references in combination do not make an invention obvious unless something in the prior art references would suggest the advantage to be derived from combining their teaching.”

That the suggestion to combine the references should not come from the applicant was forcefully stated on Orthopedic Equipment Co. v. United States, 217 U.S.P.Q. 193, 199 (CAFC 1983):

“It is wrong to use the patent in suit [here the patent application] as a guide through the maze of prior art references, combining the right references in the right way to achieve the result of the claims in suit [here the claims pending]. Monday morning quarterbacking is quite improper when resolving the question of nonobviousness in a court of law [here the PTO].”

As was further stated in *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 5 U.S.P.Q.2d 1434 (C.A.F.C. 1988):

“[w]here prior-art references require selective combination by the court to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gleaned from the invention itself. . . . Something in the prior art must suggest the desirability and thus the obviousness of making the combination.” [Emphasis supplied]

In line with these decisions, the Board stated in *Ex parte Levengood*, 28 U.S.P.Q.2d 1300 (P.T.O.B.A.&I., 1993):

“In order to establish a *prima facie* case of obviousness, it is necessary for the examiner to present evidence, preferably in the form of some teaching, suggestion, incentive or inference in the applied prior art, or in the form of generally available knowledge, that one having ordinary skill in the art would have been led to combine the relevant teachings of the applied references in the proposed manner to arrive at the claimed invention, . . . That which is within the capabilities of one skilled in the art is not synonymous with obviousness. . . . That one can reconstruct and/or explain the theoretical mechanism of an invention by means of logic and sound scientific reasoning does not afford the basis for an obviousness conclusion unless that logic and reasoning also supplies sufficient impetus to have led one of ordinary skill in the art to combine the teachings of the references to make the claimed invention . . . Our reviewing courts have often advised the Patent and Trademark Office that it can satisfy the burden of establishing a *prima facie* case of obviousness only by showing some objective teaching in either the prior art, or knowledge generally available to one of ordinary skill in the art, that “would lead” that individual ‘to combine the relevant teachings of the references.’ . . . Accordingly, an examiner cannot establish obviousness by locating references which describe various aspects of a patent applicant’s invention without also providing evidence of the motivating force which would impel one skilled in the art to do what the patent applicant has done.”

In the present case, there is no reason given in the Office Action on September 20, 2006, to support the proposed combination, other than the statements: "It would have been obvious to one having ordinary skill in the art, at the time the invention was made, to use the method, as taught by Tewfik and Fattouche, in the system of Crochiere;" "It would have been obvious to one having ordinary skill in the art, at the time the invention was made, to use the method, as taught by Hudson, Tewfik, and Fattouche, in the system of Crochiere;" "It would have been obvious to one having ordinary skill in the art, at the time the invention was made, to use the method, as taught by Tewfik, Fattouche and Van Nee, in the system of Crochiere;" "It would have been obvious to one having ordinary skill in the art, at the time the invention was made, to use the method, as taught by Sklar, in the system of Kim;" "It would have been obvious to one having ordinary skill in the art, at the time the invention was made, to use the method, as taught by Sklar and Harrison, in the system of Kim;" "It would have been obvious to one having ordinary skill in the art, at the time the invention was made, to use the method, as taught by Sklar and Hudson, in the system of Kim;" "It would have been obvious to one having ordinary skill in the art, at the time the invention was made, to use the method, as taught by McClellan and Fattouche, in the system of Crochiere;" "It would have been obvious to one having ordinary skill in the art, at the time the invention was made, to use the method, as taught by Harrison, in the system of Graham;" "It would have been obvious to one having ordinary skill in the art, at the time the invention was made, to use the method, as taught by Harrison and Agree, in the system of Graham;" "It would have been obvious to one having ordinary skill in the art, at the time the invention was made, to use the method, as taught by Harrison, in the system of Umeda;" and "It would have been obvious to one having ordinary skill in the art, at the time the invention was made, to use the method, as taught by Harrison and Van Nee, in the system of Umeda;" However, the fact that all of the prior-art references either in individual or any combination form is not sufficient to gratuitously and selectively substitute parts of one reference for a part of another reference in order to meet the applicant's novel claims because there are fundamental differences between the applicant's invention of the spread spectrum-based multichannel modulation for the UWB communications and Crochiere's filter bank approach,

Tewfik's Ultra-Wideband OFDM, Fattouche's the MC-DSSS, Hudson's method of estimating channel impulse response, Van Nee's an OFDM system, Kim's the method for generating spreading code and spreading channel signals, Sklar's the XOR units, Harrison's the method for transmuitiplexing signals between signal terminals and radio frequency channels, McClellan's approach of optimum FIR linear-phase digital filters, Graham's the modulator, Agee's discrete multiple tone communication, and Umeda's the radio receiver. Thus, the applicant submits the fact that the spread spectrum-based multichannel modulation for the UWB communications produces advantages militates in favor of the applicant because it proves that the applicant's invention produces new and unexpected results and hence is unobvious.

As stated in the above Levengood case again:

"That one can reconstruct and/or explain the theoretical mechanism of an invention by means of logic and sound scientific reasoning does not afford the basis for an obviousness conclusion unless that logic and reasoning also supplies sufficient impetus to have led one of ordinary skill in the art to combine the teachings of the references to make the claimed invention."

Therefore, the applicant submits that individual or any combination form of Crochiere, et al., Tewfik, et al., Fattouche, Hudson, Van Nee, Kim et al., Sklar, Harrison, McClellan, et al., Graham, Agee, and Umeda is not legally justified and is therefore improper. Thus, the applicant submits that the rejection on these prior-art references is also improper and should be withdrawn.

Even If Crochiere, et al., Tewfik, et al., Fattouche, Hudson, Van Nee, Kim et al., Sklar, Harrison, McClellan, et al., Graham, Agee, and Umeda Were To Be Combined In The Manner Proposed, The Proposed Combination Would Not Show All The Novel Physical Feature Of the Claims 24, 34, and 40

However, even if any combination of Crochiere, et al., Tewfik, et al., Fattouche, Hudson, Van Nee, Kim et al., Sklar, Harrison, McClellan, et al., Graham, Agee, and

Umeda were legally justified, the claims 24, 34, and 40 would still have novel and unobvious physical features over the proposed combination. In other words, the applicant's invention, as defined by the claims 24, 34, and 40, comprises much more than merely substitutes a plurality of templates to one template. Furthermore, there are fundamentally differences between the applicant's invention of the physical feature structure and expected results, and any combination of the prior-art references. It is also clear that the applicant's invention has novel and unobvious physical features over any prior-art references.

Thus, the applicant submits that the present invention of the spread spectrum multichannel modulation for the UWB communications is much more than merely substituting a plurality of templates for one template and that the claims 24, 34, and 40 clearly recites novel physical subject matter, which distinguishes over individual or any possible combination of Crochiere, et al., Tewfik, et al., Fattouche, Hudson, Van Nee, Kim et al., Sklar, Harrison, McClellan, et al., Graham, Agee, and Umeda.

The Novel Physical Features Of the Claims 24, 34, and 40 Produce New And Unexpected Results And Hence Are Unobvious And Patentable Over These References Under Section 103.

The applicant also submits that the novel physical features of the claims 24, 34, and 40 are unobvious and hence patentable under Section 103 since they produce new and unexpected results over Crochiere, et al., Tewfik, et al., Fattouche, Hudson, Van Nee, Kim et al., Sklar, Harrison, McClellan, et al., Graham, Agee, and Umeda or any combination thereof.

These new and unexpected results are the ability of the applicant's invention of the spread spectrum-based multichannel modulation for the UWB communications not only to transmit UWB signals at a very-high data rate up to 7.15 Gcps with scalability and programmability for wireless broadband communications but also to avoid interference with other WLAN devices, thereby achieving co-existence with multiple communication devices in the same environments.

Therefore, the applicant's invention of the spread spectrum-based multichannel modulation for the UWB communications is a novel and vastly superior to that of either Crochiere, et al., Tewfik, et al., Fattouche, Hudson, Van Nee, Kim et al., Sklar, Harrison, McClellan, et al., Graham, Agee, and Umeda or any possible combination thereof. The novel physical features of the applicant's invention of the spread spectrum-based multichannel modulation for the UWB communications that affect these differences are, as stated, clearly recited in the claims 24, 34, and 40.

The Dependent Claims Are A Fortiori Patentable Over Crochiere, et al., Tewfik, et al., Fattouche, Hudson, Van Nee, Kim et al., Sklar, Harrison, McClellan, et al., Graham, Agee, and Umeda

The new dependent claims 25 – 33, the new dependent claims 35 – 39, and the new dependent claims 41 - 46 incorporate all the subject matter of the new independent claims 24, 34, and 40 and add additional subject matter that makes them a fortiori and independently patentable over these prior-art references. Accordingly, the applicant submits that the new dependent claims 25 - 33, the new dependent claims 35 – 39, and the new dependent claims 41 - 46 are a fortiori patentable and should also be allowed.

Conclusion

For all the reasons given above, the applicant respectfully submits that the drawing sheets, specification, abstract, and claims are new in proper form, and that the claims all define patentable over the prior-art references. Therefore, the applicant submits that this application is now in full condition for allowance, which action applicant respectfully solicits.

Conditional Request For Constructive Assistance

The applicant has amended the drawing, specification, abstract, and rewritten the new claims of this application so that they are proper, definite, and define novel physical feature structure, which is also unobvious. Therefore, this application is submitted that patentable subject matter is clearly present. If, for any reason this application is not

believed to be in full condition for allowance, the applicant respectfully requests the constructive assistance and suggestions of Examiner pursuant to M.P.E.P. Section 2173.02 and Section 707.07(j) in order that the undersigned can place this application in allowable condition as soon as possible and without the need for further proceedings.

Very respectfully,



George J. Miao, Ph.D.

----- Applicant Pro Se -----

20400 Via Paviso, #A27

Cupertino, CA 95014

Tel. 408-865-1158

Certificate of Mailing. I hereby certify that this correspondence, if any, will be deposited with the United States Postal Service by First Class Mail, postage prepaid, in an envelope addressed to "Mail Stop Non-Fee Amendments, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450" on the date below.

Date: December 27, 2006

Inventor's Signature:



Attachment to Amendment A

Replacement Sheet Drawings

Mailed: December 27, 2006
At: Cupertino, California

Mail Stop Non-Fee Amendments
Commissioner for Patents
P. O. Box 1450
Alexandria, Virginia 22313-1450

Sir:

Pursuant to compliance with 37 CFR 1.21 (d), the word "Commuter" in Figures 8 and 14 has been changed to the word "Commutator" based on Examiner's requirement. Figures 8 and 14, in the top margin, have been labeled "Replacement Sheet." The replacement sheet of drawings includes all of the figures appearing on the immediate prior version of the sheet.